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(54) **Potassium-enriched dietary salt substitute**

(57) The substitute comprises (a) seawater salt or rock salt and (b) potassium chloride; the molar ratio of (a) to (b) being 1.5 ± 10% : 1. This gives an approximate composition of:-

NaCl 46.6%, $MgCl_2$ 6.5%, $MgSO_4$ 2.8%, $CaSO_4$ 2.2%,
KCl 41.5%, $MgBr_2$ 0.10% $CaCO_3$ 0.2%.

The dietary salt substitute provides a potassium and magnesium supplement to the diet with a reduced intake sodium and calcium and may be used in the control of hypertension.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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"Potassium-enriched dietary salt substitute"

This invention relates to a potassium-enriched salt substitute which may be used in the treatment and prevention of hypertension.

Dietary salt has been implicated as the principal etioligical factor in the genesis of hypertension and related metabolic diseases. The toxicity of table salt depends not only on the quantity ingested, but more importantly on the intake ratios of the principal cations, sodium, potassium, magnesium and calcium.

In 1974 the U.S. National Academy of Sciences advised that healthy adults need about 65 mmols of potassium (K) daily and in 1981 the U.S.A., Australia and WHO Expert Committees on Prevention of Coronary Heart Diseases recommended intake of 100 mmols or less of sodium (Na) per day.

The above recommendations suggest that the ideal intake ratio of this cation pair (Na/K) is 100/65 i.e. about 1.5. The steady state relationship between Na, K and Mg (magnesium) across the cell-membrane of the human organism is theoretically 3:2:1. Three sodium ions are extruded from the cell while simultaneously two K ions are taken up with one magnesium ion being utilised as catalyst in this sodium - potassium ATPase co-transport system. The steady state relationship of Na and K is therefore 3:2 or 1.5 in agreement with the above intake recommendations.

Sodium intake varies between 10-20 mmols/24hrs when salt is not added to the diet. The average sodium intake in an industrialised country varies from 150 - 400 mmols/day while K intake ranges from 10-80 mmols/day. Molar ratios of the principal cations in a typical table salt are as follows:-

Na:K = 40:1 K:Mg = 0.02 Ca:Mg = 0.2

On the other hand, salt obtained by the evaporation of seawater has a practically constant composition, typically:-

NaCl 77.76% $MgCl_2$ 10.88% $MgSO_4$ 4.74%
$CaSO_4$ 3.60% KCl 2.46% MgBr 0.22% $CaCO_3$ 0.34%

The hypertension rate in many industrialised countries range from 15 - 25% and is less than 3% in societies not using added salt.

Furthermore, human and animal studies confirm the fact that the rate of hypertension approaches zero as the intake ratio of Na/K approaches unity and conversely the greater the Na/K ratio the more prevalent the rate of hypertension and related metabolic diseases. A balanced intake of minerals may therefore have a profound effect in lessening both the incidence and prevalence of metabolic and related diseases e.g. cancer, and infectious diseases.

It is therefore an object of this invention to provide a dietary salt substitute having a balance between the principal cations, sodium/potassium, potassium/magnesium and with low calcium levels.

My invention provides a balanced dietary salt substitute combining salt obtained by the evaporation of seawater (i.e. fixed in its mineral composition) with potassium chloride (KCl) in the ratio of about three parts seawater salt or rock salt with about two parts of potassium chloride. The end product, after thorough mixing, has the following typical composition:-

NaCl 46.6% $MgCl_2$ 6.5% $MgSO_4$ 2.8% $CaSO_4$ 2.2% KCl 41.5%
$MgBr_2$ 0.10% $CaCO_3$ 0.2%

The salt may also contain trace amounts of KI.

Minor variations in the mixing ratios may be permitted, e.g. within ± 10%, preferably within ± 5%.

A balanced salt should not only contain all the principal cations (Na, K, Mg, Ca) but its use should not disproportionately load the electrolytic system. Calcium and sodium are relatively abundant in the average diet while potassium and magnesium are usually

deficient. The principal source of ionic calcium is from the skeleton. While 50% of body magnesium is found in the skeleton, skeletal magnesium is not readily available for exchange with the ECF (extracellular fluid). Hence the principal source of ionic Mg is the diet which is usually deficient. Hence magnesium and potassium should be supplemented in the salt with reduced sodium and calcium to balance.

While no two individuals have identical electrolytic make up, it would be inconceivable to formulate many balanced salt compositions to match each situation. A single ideally balanced composition (the mid point within the spectrum) seems the best solution. My invention provides an ideally balanced salt preparation to be sold under the Trade Mark "SafeSalt". The molar ratios of the principal cations are typically as follows:-

SafeSalt - Na/K 1.43 (ideal = 1.5 - 1)
K/Mg 2.01
Ca/Mg = 0.06

When the Na/K ratio exceeds 1.5 sodium retention usually occurs. This is so because "potassium is a key determinant of salt sensitivity" (Krishna, NEJM, May 1989). Relative K^+ abundance indicated by a Na/K ratio less than 1.5, poses no threat to the organism since the relative excess potassium is easily lost at the renal level. However, potassium being expensive relative to sodium, it should not be over supplemented beyond ideal limits of 1.5 - 1. "SafeSalt" provides adequate magnesium reported to protect against cardiovascular damage and arrhythmias in both humans and animals.

Claims

1. A dietary salt substitute comprising (a) seawater salt or rock salt; and (b) potassium chloride; the ratio of (a) to (b) being 1.5 ± 10%.

2. A dietary salt substitute as claimed in claim 1 wherein the ratio is 1.5 ± 5%.

3. A dietary salt substitute as claimed in claim 1 or claim 2 wherein principal cations are present in the approximate molar ratios:-

Na/K	1.43 ± 10%
K/Mg	2.01 ± 10%
Ca/Mg	0.06 ± 10%

4. A dietary salt substitute having the approximate composition:-
NaCl 46.6%, $MgCl_2$ 6.5%, $MgSO_4$ 2.8%, $CaSO_4$ 2.2%,
KCl 41.5%, $MgBr_2$ 0.10% $CaCO_3$ 0.2%.

5. A dietary salt substitute as claimed in claim 4 produced by mixing approximately three parts seawater salt or rock salt with about two parts potassium chloride.

6. A dietary salt substitute as claimed in any of the preceding claims comprising trace amounts of KI.

7. A dietary salt substitute substantially as herein described.

8. The use of (a) seawater salt or rock salt, and (b) potassium chloride in a ratio of about 1.5 to prepare an improved salt substitute for the prevention and control of hypertension.

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